DRUG INFORMATION-SEEKING BEHAVIOR AMONG HEALTHCARE PROFESSIONALS WITHIN THE UNIVERSITY OF UTAH COMMUNITY CLINICS

by

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STATEMENT OF THESIS APPROVAL

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ABSTRACT

In today's fast growing world of health care, the volume of drug information needed to provide competent care to patients is overwhelming. On average, health care professionals have two informational needs for every three patients seen which are either related to diagnosis or treatment. Therefore, seeking appropriate drug information to answer these informational needs is an important and valuable element of health care. Drug information can be obtained from different sources. Traditional sources like books, journals, meeting with colleagues, physicians' desk reference (PDR) or modern sources like the Internet (Google, Wikipedia), medical databases and medical literature indices. The information so obtained from these sources helps health care professionals to fill the gap in knowledge on new drugs and improve patient care.

Therefore, the purpose of this study is (1) to identify health care professionals (HCPs) reported frequencies of use for different drug information sources in the University of Utah Community Clinics to obtain drug information (2) to descriptively find out of if there existed a difference between clinicians and pharmacists in their drug information seeking behaviors.

The study design was cross-sectional and utilized a survey questionnaire to capture the drug information-seeking behaviors among health care professionals The Mission Based Survey Management tool was used to send out the surveys.

The survey response rate was 55%. Clinicians most frequently reported to use drug information databases (46%) followed by personal digital assistants (PDAs) (23%) and electronic sources (18%) while pharmacists most frequently reported to use drug information databases (78%) followed by electronic sources (28%) and medical literature indices (19%). Clinicians were more likely to use PDAs to access drug information than pharmacists which could be due to portability and easier access to drug information via PDAs at point of care.

Based on the results obtained from the study, it is reasonable to conclude that when clinicians and pharmacists were given a wide range of sources to choose from to seek drug information, most clinicians and pharmacist preferred to use drug information databases to obtain new drug information as compared to the traditional sources like books, journals and colleagues. Modern and improved technological sources of drug information have taken the place of traditional sources of drug information, reducing health care professionals' trips to the library or to the printed medical journals and books, eventually improving patient care.

Dedicated to my supportive parents,

Dr. S Krishnaraj and Mrs. Gita Krishnaraj,

My brother Venkat Krishnaraj

and

To my husband, Rohan Kumar

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CHAPTER 1

INTRODUCTION

Health care professionals face many challenges in keeping their practice current. Health care professionals cannot practice high quality medicine without constantly updating their clinical knowledge to help improve patient care. With the broad scope of family practice, most physicians and nurses are faced with informational needs related to therapy or diagnosis, while pharmacists are faced with drug-related informational needs. Thus, seeking appropriate drug information is very important for health care professionals. There are numerous ways in which health care professionals can access drug information. These include traditional sources like consultations with colleagues, enrollment in professional organizations, drug reference manuals, books, protocol manuals and more modern sources like personal digital assistants (PDAs), medical databases, and medical literature indices.[1,2,4,5,6] Meetings with sales representatives from pharmaceutical companies and Internet searches are also helpful in seeking appropriate drug information.[3,8,10] The information acquired from these sources keeps health care professionals up-to-date on the latest medications available to treat various diseases, helps them to resolve issues surrounding uncertainties and evidence, helps to improve patient care and helps to fill the gap in knowledge about new diagnoses and treatments.

Most recent studies done in the early 2000s focus on one particular source (e.g. PDAs or Internet or online databases) and one type of health care professional, describing the associated benefits and frequency of use of the source of information. It does not allow for comparison with other sources.

Therefore, the purpose of this study is (1) to identify health care professionals' (HCPs) reported frequencies of use of different drug information sources in the University of Utah Community Clinics to obtain drug information and (2) to descriptively find out of if there are differences between clinicians and pharmacists in their drug information-seeking behaviors.

CHAPTER 2

REVIEW OF LITERATURE

2.1 Why Is It Important to Obtain New Drug Information?

Seeking drug information is an important clinician activity in health care. Seeking this information is essential for problem-solving and is an important step in the complex process that begins with identifying the question and goes all the way to finding the best possible answer. Some commonly identified categories of informational needs are related to drug therapy, which is required for 26%-40% of patients and diagnosis, which is required for 38%-53% of patients. [1,7,8,9,11,12, 19] On average, physicians and nurses had two informational needs for every three patients seen related to either treatment or diagnosis. Seeking drug information appropriately to answer these questions related to treatment or diagnosis eventually helps to improve patient care by reducing medication errors.[17] Seeking drug information also helps to keep health care professionals abreast of the latest happenings in the drug world. Furthermore, it helps health care professionals in assisting their own diagnosis, following up on treatments given by specialists and adding to their clinical knowledge. [19]

2.2 Commonly Used Sources to Obtain Drug Information as Reported in Literature by Different Health Care Professionals

Health care professionals acquire drug information from a variety of sources. Sources can be classified as commercial, which include drug company representatives, drug advertisement and physicians' drug reference (PDR) and noncommercial, which include text books, medical letters, journal articles, professional meetings, hospital pharmacists, colleagues and community pharmacists. They could also be classified as written sources, which include books, journals, medical letters, drug company advertisements and physicians' drug reference and oral sources, which include professional meetings, hospital pharmacists, colleagues and community pharmacists.

2.2.1 Physicians' Drug Information-Seeking Behaviors Over Time

In the 70s, 80s and early 90s, physicians most frequently used books and journals to seek drug information followed by meeting with colleagues. As times changed and technology evolved, physicians began using the Internet and personal digital assistants (PDAs) as a source of drug information.

The investigators of a study done in 1978 with physicians on informational needs of physicians [2] concluded that most physicians needed more information on new drugs and physicians most frequently used journals followed by colleagues and books to seek drug information. Authors of a meta-analysis conducted with physicians in the United States (US) and Canada in 1997 on drug information sources used [3] found that physicians

most frequently referred to books and journals. In addition to these, physicians also consulted with colleagues and met with SRs to obtain the requisite drug information. Authors of another study conducted with general practitioners (GPs) in 1980 in the UK on usage of information sources [4] found that industrial sources such as sales representatives, drug advertisements and drug sheet compendia etc. were used to seek new drug information while professional sources such as books, journal and colleagues were used to evaluate the information obtained. Older single practice GPs were more likely to use industrial information sources. Investigators of another study done with physicians in 1980 on health care professionals' information habits and needs [5] concluded that medical literature (i.e. personal references, journals and books) were the most frequently used sources of drug information. Colleagues were the next most used source of information among physicians. Sales representatives were used as a source of information but only among health care professionals with more professional experience. The authors of a study done with physicians in 1986 on the ten most frequently used sources of information[6] concluded that physician's desk reference (PDR) was the most accessible and frequently used source of information followed by books, journals, professional meeting, colleagues, hospital pharmacists and drug company representatives. The investigators also said that drug company representatives were used more frequently by physicians than books, journals, professional colleagues and pharmacists as a source of information. Noncommercial sources of information were less frequently used than commercial sources of information. Written sources of new drug information were more frequently used than oral sources of new drug information by physicians. Among the older physicians, with more than 15 years of practice, sales representatives and

community pharmacists were a source of new drug information. A number of other studies that looked at physicians' informational needs and sources used to obtain drug information in the mid-1990s [7, 8, 9] revealed that physicians most frequently used colleagues as a source for drug information followed by books and journals. Physicians preferred print sources of information. [9]

Traditionally, physicians acquired drug information from books, journals and colleagues but the information-seeking behaviors are evolving as a result of increased practice demand, easier access to the Internet, and ever increasing clinical evidence. More than half the family physicians use the Internet to seek drug information. A survey by the American Medical Association demonstrated that the use of the Internet has grown from 21% in 1997 to 78% in 2001.[10] The reasons to use the Internet as a source of information were to enhance patient care, update knowledge and to inform clinical decisions.[11]

A study of general practitioners (GPs) through a survey in 2002 [12] showed that 48.6% of the physicians used the Internet to get information on rare diseases to help in diagnosis or to follow up on a diagnosis made by specialists, for updates on common diseases and for conditions not responding for common treatments. MEDLINE was the most commonly accessed source. The other frequently used search engines were Yahoo, Google and Alta Vista. GPs were more likely to search MEDLINE for patient-oriented material. Most GPs evaluated the information obtained from the Internet based on the reputation of the journal in which it was published. Of the total respondents, 34% of the GPs evaluated the information based on the methods employed. Once again, textbooks were ranked as the most preferred source to obtain drug information, followed by

colleagues. Authors of another study with physicians on their information-seeking behaviors through a faxed survey in 2004 [13] concluded that 59% of the physicians regularly access the Internet to seek clinical information and 73% of the physicians believe the Internet to be valuable and an important source of clinical information. Investigators of another study with physicians via a faxed survey in 2005[11] concluded that 89% of the physicians accessed the Internet to seek drug information to improve patient care, to make informed clinical decisions, to update their own knowledge or a blend of these purposes. In spite of the high usage of the Internet to seek drug information among physicians, they still preferred using journals and drug databases to obtain the required information in comparison to the Internet.

With further advances in information technology and the emergence of Personal Digital Assistants (PDAs) since the late 1990s, family physicians shifted towards the use of PDAs to seek drug information. The overall adoption rates of PDAs is between 45%-85%.[16] The reason most commonly given for the use of PDAs was that it made drug information resources rapidly accessible at point of care. It improved patient care and reduced medical errors.

Studies were done between 2000-2005 to evaluate the clinical use of PDAs [15, 16] and benefits associated with the use of PDAs. [17] Authors from the study concluded by saying that ePocrates Rx (a comprehensive drug information guide that can be downloaded from the Internet) saved time required for drug information retrieval. PDAs could be easily incorporated into their usual workflow and improved their drug-related decision-making.[15,17] Most family physicians (71%) were big adopters of PDAs compared to specialists. About 33% of hospital practicing pharmacists used PDAs either at home or

at work for similar reasons and purposes. [16] Physicians felt that the use of PDAs helped them to improve patient care and was a valuable tool in learning about new drugs. About 61% of the physicians believed that the use of PDAs reduced preventable adverse drug events and medication errors by three times or more. [17] Authors of a meta-analysis study done among residents and medical students on the use of PDAs between 1993-2004[18, 19] concluded that 60%-70% of the residents used PDAs for patient care. Resident physicians' felt it was valuable in seeking the required information at the point of care. In spite of the high usage, many physicians' preferred books and journals as a source of information. [19]

Thus, from all these studies mentioned above, it is reasonable to conclude that in recent times with advances in technology, physicians have begun using the Internet and PDAs as a source of drug information, but when physicians were asked their primary source of drug information, most physicians rated books and journals as their primary source for information.

2.2.2 Nurse Practitioners' Drug Information-Seeking Behaviors Over Time

Nurse practitioners differed from physicians and pharmacists in usage of the different sources for drug information. Their informational needs were similar to physicians but the sources preferred to acquire that information varied from physicians. Human sources of information such as supervising physician, sales representatives and colleagues were preferred compared to print and online sources.

Evidence from a study done with nurse practitioners (NP) in a primary care setting by means of a survey and followed by an interview in 2003 showed that, on average, there were two informational needs for every three patients seen and they were related to treatment and diagnosis. [20] The investigators concluded that 63% of the NPs asked their supervising physicians about drug information, 61% used drug reference manuals and 51% of the NPs used books as a source of information. Authors of another study done with clinical nurses through a survey in 2005 that consisted of questions, interviews and observations[21] concluded that clinical nurses relied extensively on books for medical information. GPs and information from sales representatives were also valued. Almost 60% of clinical nurses and 38% of nurse students, respectively, preferred human sources of information rather than online sources. Other similar studies on nurses' information-seeking behavior [22, 23] reported that nurses preferred human sources of information to text and online sources. Researchers of the study with community nurses done in July 2003[24] concluded that community nurses sought drug information primarily through journals, but also utilized sales representatives, community pharmacists, nurse specialists and GPs as a source of drug information. Other studies done to find out nurses' use of the Internet and PDAs to seek drug information [25, 26] reported that the use of PDAs among nurses to seek drug information is limited. They preferred print sources instead.

2.2.3 Pharmacists' Drug Information-Seeking Behaviors Over Time

Pharmacists' need for information was mostly restricted to drugs. They sought drug information through text books followed by use of web sites.[27,28] Colleagues were very

rarely used as a source of drug information among pharmacists. The use of PDAs was also very limited among pharmacists.

Investigators of a study done with pharmacists in hospitals and community pharmacies in 1978[27] concluded that both groups sought drug information from a narrow range of textbooks. Authors of another study done with pharmacists in Alabama in 2006 [28] concluded that drug facts and comparisons were most frequently used followed by PDR. The use of PDAs was low (19%) among the pharmacies. Authors of another study done with pharmacists via an online survey in Singapore 2009 on the drug information resources used [29] concluded that 82% of the pharmacists used reference text as a source of drug information. Twenty-three percent of the pharmacists reported to use web sites to seek drug information. Authors of another study done with pharmacists in 2005 on their perception about the pharmaceutical industry [30]concluded that most pharmacists (58%) valued the information given by pharmaceutical sales representatives.

2.3 Summary of the Background

1. All heath care professionals are faced with drug information needs. Health care professionals are most frequently faced with drug informational needs related either to diagnosis or treatment of patients.
2. In order to answer these drug information-related needs, health care professionals have access to a variety of drug information sources. These sources can be differentiated as commercial, which include drug company representatives, drug advertisement and physicians' drug reference (PDR) and noncommercial, which include text books, medical letters, journal articles,

professional meetings, hospital pharmacists, colleagues and community pharmacists. They could also be classified as written sources, which include books, journals, medical letters, drug company advertisements and physician's drug reference and oral sources, which include professional meetings, hospital pharmacists, colleagues and community pharmacists.

3. Among the various sources of information available, physicians were more likely to use books, journals and meeting with colleagues as a source of drug information. Sales representatives were used as source of information only among physicians with greater experience.
4. But with the growth in the technological field and the presence of the Internet in the mid-1990s, physicians began using the Internet to seek drug information. There was growth in the use of Internet from 21% in 1997 to 78% in 2001. Various search engines and medical databases were used for the purpose. Most physicians used MEDLINE to seek drug information with more than 59% of the physicians using the Internet.
5. With the advent of personal digital assistants (PDAs) in the early 2000s, family physicians became early adopters of PDAs. More than half the family physicians use PDAs to seek drug information at the point of care. Physicians felt that the use of PDAs has improved their ability to make informed clinical decisions and reduce medical errors. They also felt drug information has become more accessible and specific information related to a particular drug could be retrieved in a matter of seconds.

6. Nurses, on the other hand, preferred using books, journals, supervising physicians and sales representatives as a source for seeking new drug information. PDA use among nurses was very limited
7. Pharmacists most frequently used textbooks to seek drug information followed by the use of the Internet. They also valued the information given to them by sales representatives.
8. Previous research on drug information gathering largely predates PDAs and the Internet. The recent research on drug information sources used by health care professionals focuses on one particular source such as PDAs or the Internet and does not allow for comparison with other sources.

Therefore, the purpose of this study is (1) to identify across the different sources of drug information available which sources of information are being used by health care professionals in the University of Utah Community Clinics to obtain new drug information (2) to descriptively find out if there existed a difference in the way physicians' and pharmacists' seek drug information.

CHAPTER 3

METHODS

This was a cross-sectional observational survey of sources of drug information. The goal of this small-scale study within the community clinics in the University of Utah was to determine from where health care professionals obtain drug information to improve clinical care provided to patients and stay updated on the latest drugs. This study also tried to descriptively identify if there exists a difference in the way health care professionals seek drug information.

3.1 Study Setting

This study was conducted in the University of Utah Outpatient Community Clinics. The ten clinics participating in the study were the following:

- Redstone
- Redwood
- Greenwood
- Madsen
- Sugarhouse
- Centerville

- Stansbury
- Westridge
- South Jordan
- Parkway

3.2 Study Design

This study was a cross-sectional analysis using an electronic survey tool. The questionnaire was created by adapting surveys from previous studies.[3, 6, 13, 20] Questions were formatted by using a combination of multiple choice, matrix questions and short answers.

3.3 Study Subjects

The study population included all the primary care providers within the community clinics. The primary care providers were primary care clinicians, nurse practitioners, pharmacists, physician assistants and resident clinicians. The survey was sent to all the above mentioned health care professionals within the participating clinics. There were about 57 clinicians, 62 pharmacists, 2 nurse practitioners, 9 physician assistants and 24 resident physicians within the community clinics who were surveyed. Since the total sample size was small (154), the study did not have enough power to detect difference between the groups. The results were reported quantitatively. The response rate for similar surveys done previously was between 35-80%. [6, 3, 20, 30] The lower range were for surveys that had just one follow-up while the higher range was for surveys that had multiple follow-ups, interviews and personal observation. For this study,

a response rate between 50%- 60% was expected, as the internal Utah Health Research Network (UHRN) email was used, which physicians, physician assistants, resident physicians and nurse practitioners accessed more often.

3.4 Data Collection

The Mission Based Survey Management tool (MBM), which is an E-survey tool, was used to collect the data. The E-survey offers the following features: (i) allows the researcher to create a set of questions, (ii) makes the questions available to the study participants by sending them an email or sharing a URL and (iii) allows for viewing the responses to questions as and when they are answered. The UHRN internal email network was used to send out the surveys.

3.5 Data Reporting

Once the survey was completed and the time period to fill out the surveys was over the MBM provided a brief report as well as a detailed report in the form of a word document. It also provided a PDF file with the raw data. An Excel spreadsheet was also provided in which each row represented one respondent and each column represented one question with answers from left to right on each row. From these data, graphs and tables were made that summarized the demographic information, the mean, standard deviation, frequency and percentages for all the questions.

3.6 Questionnaire Preparation

The questionnaire was set up after an extensive literature review.[31,32] The review included reading articles related to wording and formatting of the questionnaire for easy understanding by the participants. The articles also provided specific information regarding various styles for formatting the questions to obtain appropriate information related to the study question. In addition to the above information, the articles also provided in-depth knowledge on the common pit falls that should be avoided while developing and formatting the questionnaire. Within the questionnaire, every research aspect was a separate question that enabled the investigator to know the participants' preference or perception for the different questions. Negatively worded questions were avoided to prevent participants from being biased. The scales used to measure the preference in the matrix questions are common Likert scales that have been used in a number of studies previously for easy understanding. [20, 31]

The first step after the above mentioned literature review was to develop the survey questions. For this study, the survey included three research questions with 26 aspects. The three questions were related to sources of drug information, value of drug company sales representatives, impact of restrictions and alternatives preferred in absence of sales representatives. Only the first question is addressed in this thesis.

With reference to Table 3.1, multiple choice questions were used for basic demographics such as age, sex, time in practice, time since graduation and location of practice. This information helped to describe the survey respondent characteristics. Matrix questions were used to identify and qualify preferences for the different sources used to obtain new drug information. The matrix questions in the questionnaire were

Table 3.1- Description of Information Collected from the Questionnaire

SR No	Variable	Type of variable
1	**Demographic Data**	
(a)	Age	Continuous Variable
(b)	Sex	Categorical Variable
(c)	Years since complete training	Continuous Variable
(d)	Years in practice	Continuous Variable
2	**Objective**:	
(a)	Frequency of reported use of the different sources to obtain drug information and identify is there exists a difference in drug information seeking behavior	Categorical Variable
(b)	Types and frequencies of use of the different sources for obtaining new drug information	

related to frequency of use of the different resources for making clinical decisions. The subquestion choices within these matrix questions were chosen based on previous literature findings for the most frequently used sources to obtain drug information and suggestions from health care professionals [3,6,13,]

The survey was tested by health care professionals including pharmacists and physicians. Feedback was incorporated into the revised questionnaire with the goal of optimizing the likelihood of obtaining the desired information. Feedback on the wording of the questions was provided by the committee members as well as other physicians. The questionnaire was designed to take 10 minutes, which was verified by the committee members and health care professionals. The questionnaire is presented in Appendix A. Once the questionnaire was created, applications were sent to the Institutional Review Board (IRB) and Utah Health Research Network (UHRN). The UHRN application was submitted online on Jan 9th 2009 and the approval was received on Jan 26th 2009. The

IRB application was completed and sent online on Jan 20th 2009. The application number was IRB_00031881. The study was exempt, under 45 CFR 46.101(b), Category 2, from the Federal regulations governing human research and an email notifying the same was sent on Feb 3rd 2009.

The second step after the questionnaire development, the IRB and UHRN approvals was to send out the questionnaire to the different health care professionals within the community clinics participating in the study. For this, the MBM List Builder application was used. In E-surveys, these lists are referred to as 'Distribution Lists.' For the purposes of this study, 2 distribution lists were created, a 'Closed Distribution List' and an 'Open Access Distribution List.'

The 'Closed Distribution List' would allow only health care professionals' whose email addresses were known to participate. These email addresses were obtained through the University database, while the 'Open Access Distribution Lists' was for those health care professionals who wanted to answer the survey through their outlook email address, that was sent via the Utah Health Research Network (UHRN) email network.

The third step after the distribution list was prepared was to set a campaign for the survey. In E-surveys, setting up a campaign involves setting up a time frame for the participants to answer the survey. For the purpose of this study, the time frame was "54 days" i.e., March 6th 2009 - April 29th 2009. The campaign feature within the MBM tool allows the principal investigator to send reminders to the health care professionals who have not filled out the survey or who had not accessed the survey, thus assisting in regular and timely follow up. Once the campaign was activated, the researcher was not

allowed to make any changes to the questionnaire, ensuring that all the participants received the same questions.

Once these three steps were in place, a cover letter indicating the purpose of the research was sent to all the participating health care professionals using the distribution lists as well as the UHRN internal email network. The letter explained the purpose of the survey and that a link or URL would be arriving in their email inboxes. Follow-up emails were sent twice in a span of 15 days, after which follow-up emails were sent every 4 days to only those health care professionals who had not accessed or answered the survey. This ensured that all of the participating health care professional received it and were aware of the research. Follow-up was done eight times via email. To improve the response rate, the principal investigator also attended three provider meetings and handed out the survey questionnaire in person, requesting health care providers to participate. Telephone follow-up calls were also made to the pharmacy sites within each clinic to encourage a better response rate among pharmacists.

CHAPTER 4

RESULTS

4.1 Response Rate

Out of the 154 surveys that were emailed, 85 (55%) responded. Of the 85 who responded, 35 were physicians, 7 were physician assistants [PA], 6 were resident physicians, 1 was a nurse practitioner [NP] and 36 were pharmacists. Response rates by health professional type are presented in Table 4.1. For the purpose of this study, physician assistants and nurse practitioners were grouped together with the physicians group. PA and NP were grouped together with the physicians group for the following reasons: 1) the sample size was too small to consider them as a separate group, 2) they performed similar functions (diagnosing the disease state of the patient or checking blood pressure or prescribing medicines for the disease state) and 3) they had similar respondent characteristics to the physicians. For this study, the group of physicians, NP and PA, was referred to as 'Clinicians.' Resident physicians were excluded as (1) they were part-time employees at the clinics and rotated among different specialties, (2) they were all in training, (3) they met with sales representatives too often (2-3 times a month) for new drug information which could be attributed to their rotations and part-time

Table 4.1 - Response Rate by Type of Healthcare Professional

Type of Health Care Professional	Total number of respondents	Number of respondents	% of respondents by each category
Physicians	57	35	60%
Physician Assistants	9	7	78%
Resident Physicians	24	6	25%
Nurse Practitioners	2	1	50%
Pharmacists	62	36	58%

employee status and (4) the count was too small to be considered as a separate group (6).

Thus, for this study, the total number of clinicians was 43 and of pharmacists was 36 with a response rate of 51%.

4.2 Demographic Description of Health Care Professionals

A summary of the responder's characteristics is shown in Table 4.2. Of the 79 respondents, 43 were clinicians and 36 were pharmacists. Of the 43 clinicians, 17 (40%) were males and 26 (60%) were females while among the 36 pharmacists, 14 (39%) were males and 22 (61%) were females. The mean age (SD) for clinicians was 43.23 years (9.52) and for pharmacists was 40.19 years (10.60). The average time (SD) since training for clinicians in years was 11.76 (9.48) and 13.02 (10.09) for pharmacists. The average time (SD) in current practice for clinicians in years was 6.25 (5.83) and 9.23 (6.75) for pharmacists. A t-test was performed for all the continuous variables in the demographic data and a significant difference was found between the groups for the time in current practice in years (CI- 2.55-3.01, p=0.04).

Table 4.2 - Survey Respondent Characteristics

Variable	Clinicians		Pharmacists		P Value
Total	**43**		**36**		
Sex	N	%	N	%	0.95
Male	17	39.53 %	14	38.88 %	
Female	26	60.46 %	22	61.11 %	
Age(mean)[std dev]	(43.23)	[9.52]	(40.19)	[10.60]	0.18
>_25 to <35	10	23.23 %	13	36.11 %	
>_ 35 to <45	13	30.23 %	14	38.88 %	
>_ 45	20	46.51 %	9	25 %	
Time since you completed your training, Yrs(mean)[Std dev]	(11.76)	[9.48]	(13.02)	[10.09]	0.56
<1	6	13.95 %	0		
1 >10	15	34.88%	16	44.44 %	
10 >20	12	33.33%	11	30.55 %	
>_ 20	10	23.25 %	7	19.44 %	
Time in current practice setting, Yrs(mean)[Std dev]	(6.25)	[5.83]	(9.23)	[6.75]	0.04
<1	8	18.60%	1	2.77 %	
1>5	14	32.55%	12	33.33 %	
5>10	10	23.25 %	9	25 %	
>_ 10	11	25.58 %	14	38.88	

4.3 Clinicians' and Pharmacists' Reported Frequencies of Use of the Different Sources for New Drug Information

The top sources used for seeking drug information among clinicians and pharmacists were (1) drug information databases such as Micromedex and ePocrates, (2) hand-held devices such as PDAs, (3) other online sources such as Google and Wikipedia and (4) medical literature indices such as PubMed, Medline, and CINAHL. This was determined by the frequencies at which the healthcare professionals reported using each source 'At least daily.'

4.3.1. Drug Information Databases (Micromedex, ePocrates)

In Figure 4.1, the X – axis represents the type of health care professional and the Y- axis the percentage of reported use of drug information database for seeking drug information.

About 78% of the pharmacists reported the use of drug information databases at least daily. Eleven percent of the pharmacists reported to use it weekly and another 11% used it monthly. Clinicians' use of drug information databases was more dispersed. 47% of the clinicians reported to use it at least daily, 16% of the clinicians reported to use it weekly, 14% of the clinicians reported to use it monthly, 7% of the clinicians used it once in 6 months, 3% of the clinicians used it yearly and 10% of the clinicians used it less than once a year.

Thus, from Figure 4.1, it is reasonable to conclude that pharmacists within this

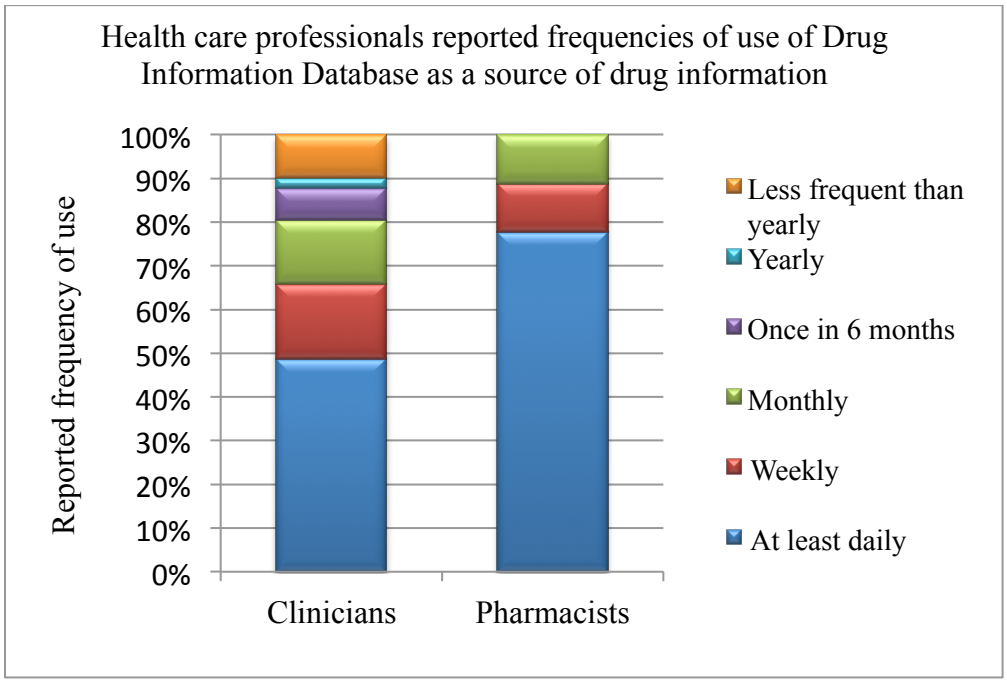

Figure 4.1- Reported Frequencies of Use of Drug Information Database for Seeking Drug Information by Clinicians and Pharmacists

study reported the use of drug information databases more frequently for drug information than clinicians within this study.

4.3.2. Personal Digital Assistants (PDAs)

In Figure 4.2, the X- axis represents the type of health care professional and the Y- axis the percentage of reported use of Personal Digital Assistants (PDAs) for seeking drug information. About 23% of the clinicians reported the use of PDAs at least daily as compared to 11% of the pharmacists. Sixteen percent of the clinicians and 17% of the pharmacists used it weekly. Approximately 9% of the clinicians and 5 % of the pharmacists reported to use it monthly. Only 3% of the pharmacists used PDAs once in

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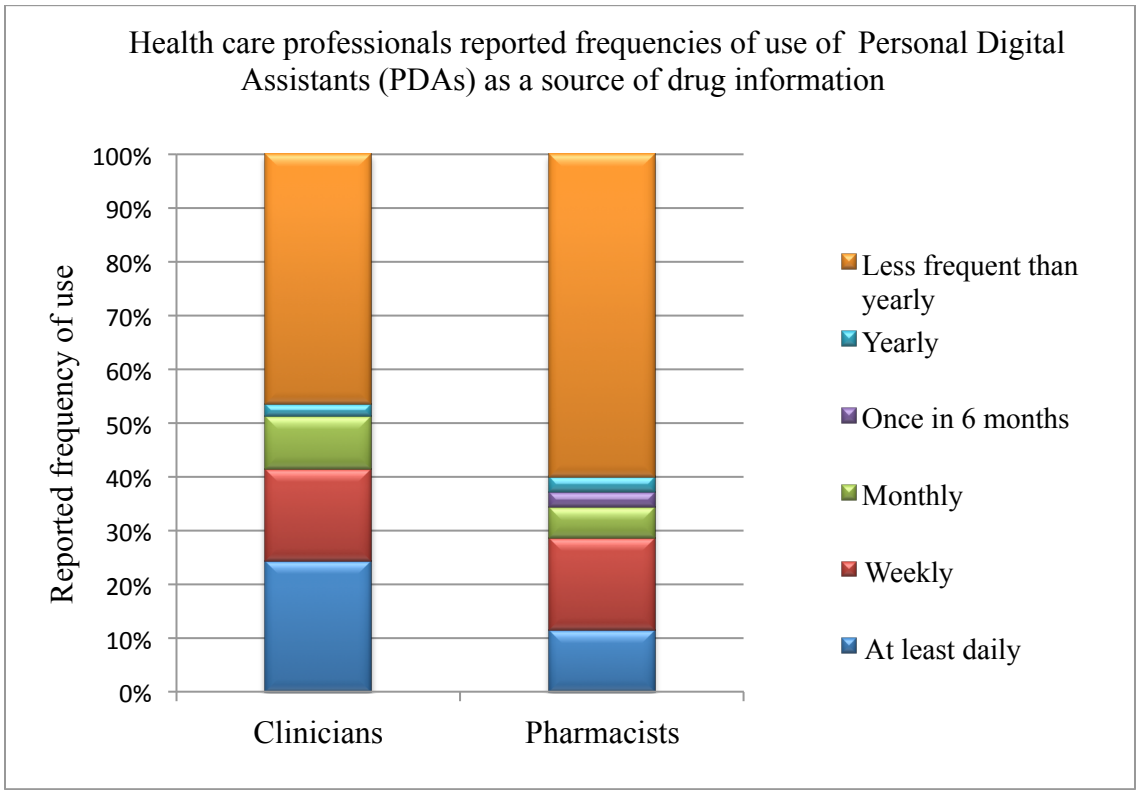


Figure 4.2- Reported Frequencies of Use of Personal Digital Assistants (PDAs) for Seeking Drug Information by Clinicans and Pharmacists

six months. Two percent of the clinicians and 3% of the pharmacists used PDAs yearly and 44% of the clinicians and 58% of the pharmacists used PDAs less than once a year.

Thus, from Figure 4.2 it can be concluded that the clinicians within this study reported the use of PDAs more frequently than pharmacists within this study to obtain drug information. From Figure 4.2, it was very striking to notice that a lot of clinicians and pharmacists reported using PDAs less frequently that yearly to search for drug information. Therefore, when their reported usage was segregated by age, it was observed

that clinicians (55%) and pharmacists (88%) greater than or equal to 45 years of age were less likely to use PDA. This is represented in Figures 4.3 and 4.4.

In Figures 4.3 and 4.4, the X- Axis represents age in years and the Y- Axis represents the percentage of reported use of Personal Digital Assistants(PDAs) by type of health care professional. About 40% of the clinicians and 45% of the pharmacists between the age group of greater than and equal to 25 years but less

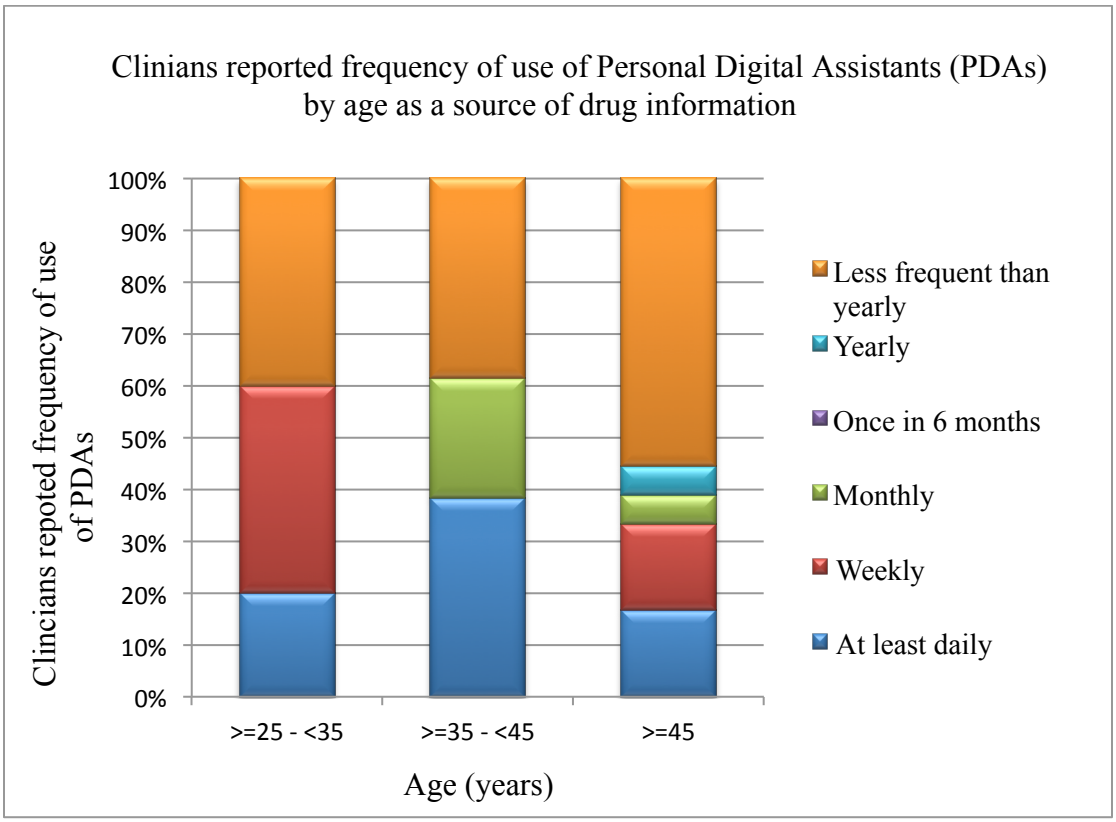


Figure 4.3– Clinicians Reported Frequency of Use of PDAs by Age as a Source of Drug Information

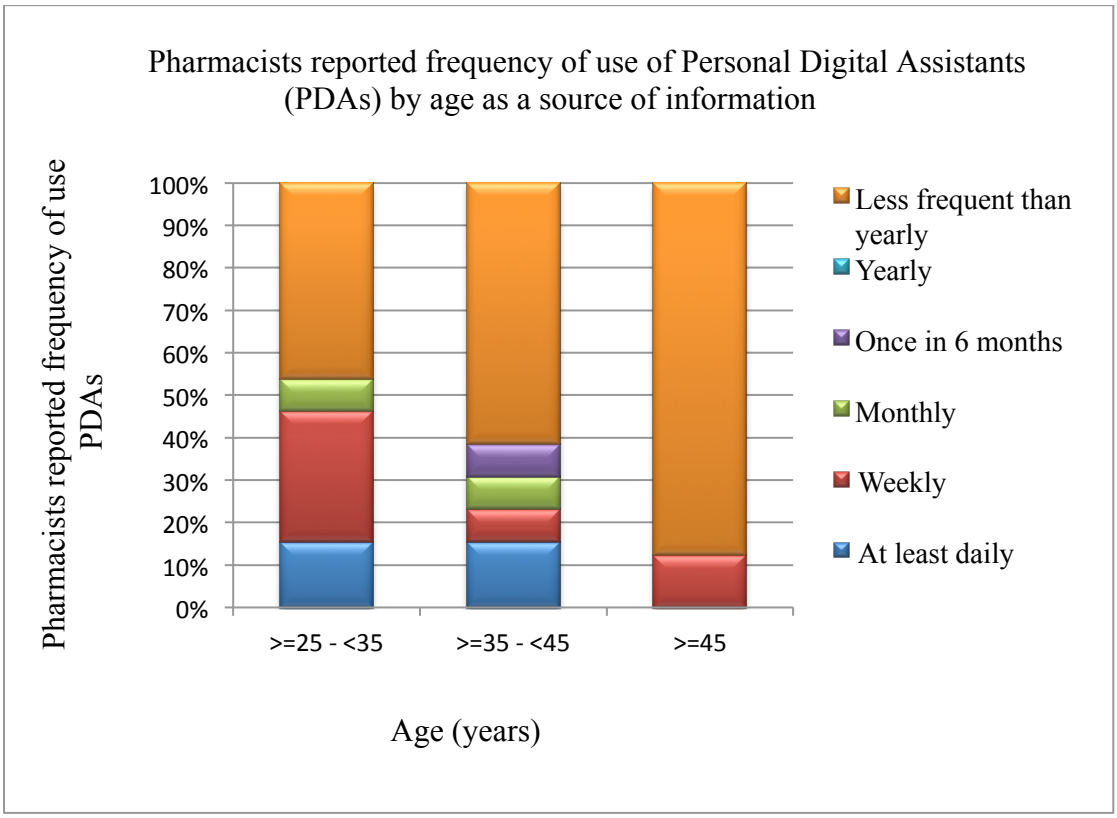


Figure 4.4 – Pharmacists Reported Frequency of Use of PDAs by Age as a Source of Drug Information

than 35 years reported using the PDAs less than once a year. Approximately 38% of the clinicians and 62% of the pharmacists between the age groups of greater than and equal to 35 years but less than 45 years reported using the PDAs less than once a year. Among clinicians and pharmacists greater than and equal to 45 years of age, about 55% and 89%, respectively, reported the use of PDAs less than once a year to obtain drug information.

4.3.3. Electronic Sources (ES) (Google, Wikipedia)

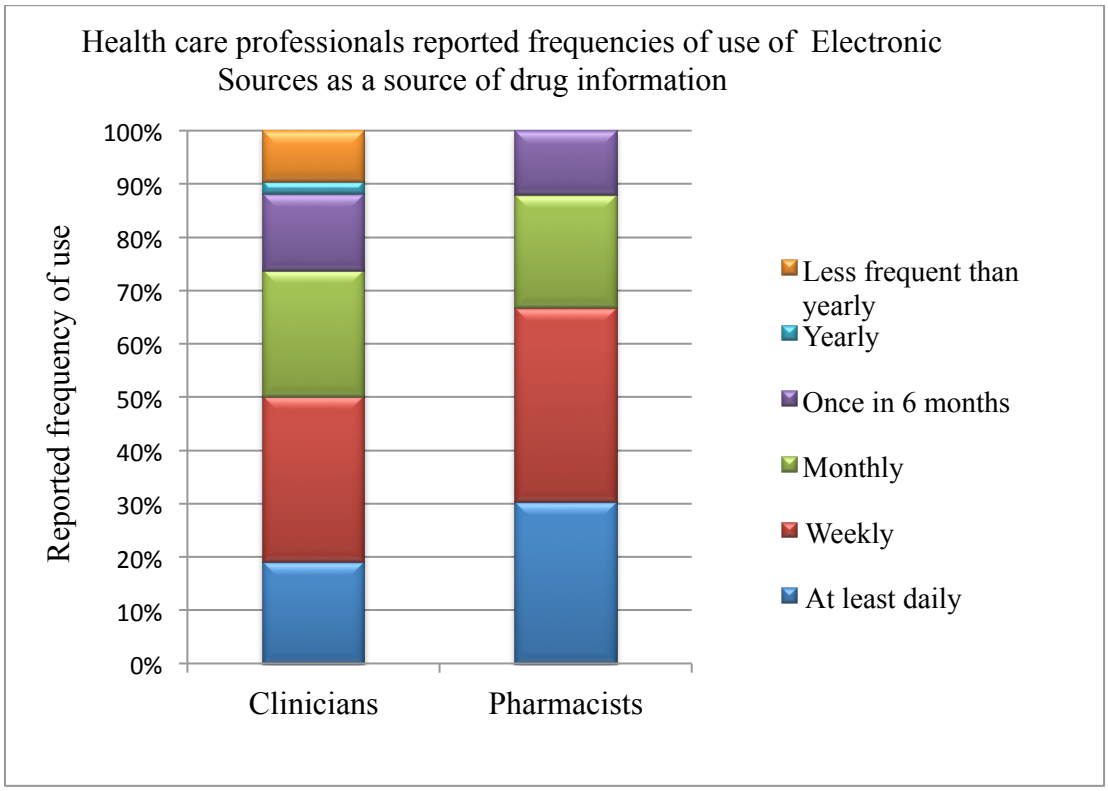
In Figure 4.5, the X- axis represents the type of health care professional and the Y- axis the percentage of reported use of Electronic Sources (ES) for seeking drug information. The reported use of ES for drug information was somewhat evenly spread out between the clinicians and pharmacists. Eighteen percent of the clinicians and 28% of the pharmacists reported the use of ES at least daily, 30% of the clinicians and 33% of the pharmacists reported the use of ES weekly, 23% of the clinicians and 19% of the pharmacists reported the use of ES monthly, 14% of the clinicians and 11% of the pharmacists reported the use of ES once in 6 months, 2% of the clinicians reported the use of ES yearly and 9% of the clinicians reported the use of ES less than once a year for drug information.

Thus, from Figure 4.5, it can be seen that clinicians and pharmacists within this study used electronic sources (Google, Wikipedia) to the same extent to obtain drug information.

4.3.4. Medical Literature Indices (MLI)

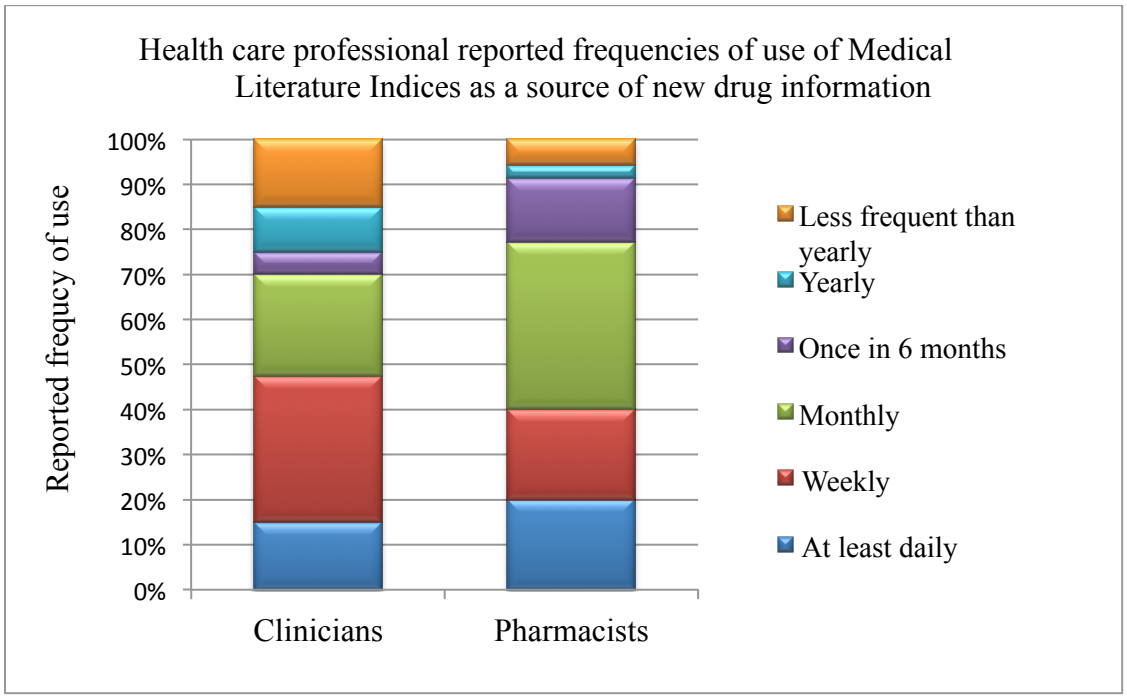
(PubMed, MEDLINEPlus, CINHAL)

In Figure 4.6, the X- axis represents the type of health care professional and the Y- axis the percentage of reported use of Medical Literature Indices (MLI) for seeking drug information. Clinicians (14%) reported the use of MLI at least daily, 30% of the clinicians used MLI weekly, 21% reported the use of MLI monthly, 5% reported the use of MLI once in 6 months, 9 % reported the use of MLI yearly and 14% reported the use



Note- Electronic Sources- Google, Wikipedia

Figure 4.5 - Reported Frequencies of Use of Electronic Sources for Seeking Drug Information by Clinicans and Pharmacists.



Note- Medicial literature indicies- PubMed, MEDLINEPlus, CINAHL

Figure 4.6 - Reported Frequencies of Use of Medical Literature Indicies for Seeking Drug Information by Clinicians and Pharmacists

of MLI less than once a year. Among pharmacists, the reported use of MLI was somewhat dispersed. Nineteen percent of the pharmacists reported the use of MLI at least daily and another 19% reported the use of it weekly. Thirty–six percent of the pharmacists reported the use of MLI monthly, 14% of the pharmacists reported the use of MLI once in 6 months, 3% of the pharmacist reported the use of MLI yearly and about 5% of the pharmacists reported the use of MLI less than once a year.

Thus, from Figure 4.6, it is reasonable to conclude that pharmacists within this study reported the use of medical literature indices to seek drug information on a daily basis while clinicians' within this study reported the use of it weekly to seek drug information.

4.4 Information Sources Used by Healthcare Professionals, Ranked by the Percentage of Respondents Who Used Them "At Least Daily"

Ranks for the different resources reported to be used by clinicians and pharmacists are shown in Table 4.3. This table was compiled from tables in Appendix B, using the reported percentage frequency from the "At Least Daily" column for resources used by the health care professionals'. Clinicians and pharmacists both ranked drug information database as their first choice for seeking new drug information (47%, 78%, respectively). Clinicians ranked PDAs (23%) as the second most frequently used source while Pharmacists ranked electronic sources (28%) as the second most frequently used source to seek drug information.

Table 4.3 - Information Sources Used by Healthcare Professionals,
Ranked by the Percentage of Respondents
Who Used Them "At Least Daily"

Resource Used	Clinicians' Rank	Pharmacists Rank
Drug information database	1	1
Personal Digital Assistants	2	4
Electronic Sources	3	2
Medical literature indices	4	3
Journals	5	4
Books	6	6
Drug Information Service	6	5

Note: Pharmaceutical Sales representatives, Medical Science liaisons', Request from Pharmaceutical Manufactures and Product websites were the least frequently used resources.

CHAPTER 5

DISCUSSION

5.1 Reported Sources Used by Healthcare Professionals to Seek New Drug Information

Seeking drug information is a complex process that integrates written and oral sources of information. Because of the exponential increase in medical knowledge and the broad scope of family practice, it has become essential that health care professionals stay abreast of the latest finding in the drug world to improve patient care.

Results from this study indicate that most clinicians (47%) within the community clinics reported the use of drug information databases (micromedex, ePocrates) to seek drug information followed by PDAs (23%) to seek drug information. Among the 23% of the clinicians who reported using PDAs to seek drug information, about 60 % of the clinicians greater than age 45 years reported using the PDA less than once a year. A possible reason for this could be the lack of skill required to use the PDA to retrieve the required drug information or the investment involved with the instrument and its associated applications required for seeking drug information. Another reason could be resistance to change on the part of the older health care professionals in the way they seek drug information. Books and journals were reported to be used lesser among clinicians to seek drug information. Colleagues were hardly used as a source of information among

clinicians. The use of the Internet to seek drug information was also reported by 17% of the clinicians. In contrast to these study findings, literature[2,3,4,6,9] indicated that among clinicians, there was a fairly high usage of books, journals, meeting with colleagues and PDAs, in this order, to seek drug information. This difference in the sources used to seek drug information could be most likely due to growth in the technological field. Post-Internet boom and PDA invention, growth in the technological field has improved the access to different drug information resources at the point of care. Physicians have become more confident in being able to use the Internet and PDAs, making retrieval of drug information easy and less time consuming. This reasoning is supported from previous study findings. A study by Bennett et al. that focuses on the use of the Internet, concluded that health care professionals use of the Internet as a source to seek drug information has increased from 4.4 times/month in 2001 to 8.6 times/month in 2003. [14] Another recent study that focuses on the clinical use of a hand-held drug reference guide[15] showed that physicians felt this technology saved time to get the drug information at the point of care, improved patient safety by reducing medical errors and could be incorporated into their work flow. Both the studies mentioned above did not allow for comparisons with other sources of information or health care professionals. Thus, results from this study as reported by clinicians indicate that when given a choice between traditional sources of information and modern sources of information, they reported preferring using modern sources of drug information.

Pharmacists, on the other hand, differed slightly from clinicians in the way they seek drug information. Most pharmacists (78%) indicated that they used drug information

databases to seek drug information followed by the use of medical literature indices (19%). Books and journals were among the least frequently used resource to seek drug information. This finding differs from literature [27, 28, 29] which suggest that pharmacists prefer using text books as their primary source of drug information. The possible reasons for this difference could be because pharmacists' drug information needs are very specific, making it easier for them to retrieve the required information from the vast body of literature. The other reason could be improved access to computers at the work place making it more feasible for them to find the required information and the short time frame since their graduation. Almost half the pharmacists within this study population had graduated within the last 10 years, during which using the Internet to seek drug information was at its peak. As a result of which, most were trained and more confident in using modern technology to seek the required drug information. Previous literature findings focus on one type of information source and health care professional and do not allow comparisons. Thus, results from this study as reported by pharmacists indicate that when given a option between traditional sources of information and modern sources of information, they reported preferring using modern sources of drug information.

Findings from this small-scale study tries to fill the gap in literature by comparing clinicians and pharmacists and the different types of information sources preferred when given a choice between traditional and modern sources. It provides an insight into how health care professionals within the community clinics are reporting a shift towards the use of modern technology in seeking drug information. This timely access to drug information at point of care can improve patient care by reducing medical errors.

5.2 Limitations of the Study

There were a few limitations to the study that may have prevented acquisition of better information. The study included only primary care providers within the University of Utah Community Clinics that constrained the sample size. Thus, the first limitation of the study was small sample size (154). The second limitation was the short time frame of 52 days. This limited the number of follow-ups that could be done for the study. The third limitation was the low response rate. Only 85 (55%) of the total 185 who were mailed the survey responded. An increase in the time frame for the study could have increased the response rate. The fourth limitation of the study was the exclusion of resident physicians. The reasons for the exclusion of resident physicians were (1) they were not full time employees at the clinics, (2) they did rotations among different clinics and specialties, (3) their time in current practice was less than 3 years and all of them were in training and (4) they were visited too often by sales representatives (2-3 times a week. This could be due to the fact that they rotated at different clinics that have different restrictions and their part-time employee status and (5) small sample size (6). This exclusion of resident physicians from the study further decreased the response rate. The fifth limitation of the study was presence of effect modifiers which were not controlled for. In this study, age and the compound effect of age and time in practice were the effect modifiers. In retrospect, the use of subgroup analysis would have allowed us to control for these variables, enabling better interpretation of the results. The sixth limitation of the study was related to the pharmacist group in which 9 other pharmacists from specialty practice clinic sites were included. The reason behind not excluding them was that they were still a part of the community clinics, except that their functions were highly

specialized. The seventh limitation of the study was the grouping of physician assistants and nurse practitioners with the physician group. The reasons to group them together were (1) similarity in functions performed with the physicians, (2) full-time employee status which made them more aware of the clinic rules, (3) similar average time in current practice and (4) small sample size for physicians assistants (7) and nurse practitioners (1). This grouping resulted in another limitation of preventing in-between group differences from being captured. Finally, the results of this study are somewhat limited because the sampling frame included physicians associated with a University medical center. Physicians in nonacademic settings may have different information-seeking behaviors.

5.3 Future Work

In future work, to improve the generalizability, (i) the study could expand the sampling frame to include physicians, nurse practitioners, and pharmacists practicing in nonacademic settings or (ii) carry out a similar study in India in a similar community clinic setting with general practitioners, nurses and pharmacists to find out how these health care professional gather drug information required to improve patient care.

CHAPTER 6

CONCLUSION

With new and advancing digital systems, it is important to know health care professionals' preferences and drug information-seeking behaviors. This survey was initiated to study how health care professionals were seeking drug information and to find out descriptively if there were any differences in their information seeking behaviors. Results from this study indicate that there were slight differences in the way clinicians and pharmacists sought drug information. Drug information databases were reported to be the most frequently used by clinicians and pharmacists to seek drug information. PDAs were reported to be the next most frequently used source by physicians while among pharmacists, it was medical literature indices (PubMed, MEDLINEPlus, CINHAL) followed by use of electronic sources like Google and Wikipedia among both the groups.

Thus, from the results of this study, it is reasonable to conclude that the way in which health care professionals are seeking drug information is undergoing a change. When clinicians and pharmacists are presented with a wide range of choices for seeking drug information, modern improved technology is preferred to seek the required

information as compared to the traditional sources of information like books and colleagues. The use of the Internet and PDAs as a medical information resource has taken the place of books and colleagues that were traditionally used as an important source of drug information. Institutional investment in providing the PDAs to their health care professionals, the required applications searching drug information for a nominal fee in addition to appropriate training in using the different applications can help health care professionals to improve patient care. For training purposes, the medical librarians could play a vital role in bridging the gap between the health care professionals and improved technology. The librarians could provide appropriate training to health care professionals to use the different drug information resources and create awareness about the available resources. The use of the Internet and PDAs to seek drug information should be incorporated into the residency curriculum to help health care professionals use this technology to their benefit. The impact of this investment could help the future generation of health care professionals to seek suitable drug information related to specific patient care within a matter of seconds. It could help clinicians peruse more drug information needs per patient. From a research stand point, it would provide more data on the way health care professionals seek drug information, making comparative studies possible across a broader spectrum of informational sources. It could help reduce the number of medical errors due to timely access of drug information via the PDAs or Internet.

This understanding of health care professionals' information needs with the community clinics can help the institution design suitable drug education programs specific to clinicians' and pharmacists' needs, ultimately improving patient care.

APPENDIX A

QUESTIONNAIRE

Dear Clinic Provider,

This survey is being conducted by Asha Krishnaraj, a graduate student in the University of Utah Department Pharmacotherapy, as a thesis project with the help of collaborators from the Department of Pharmacotherapy and School of Medicine including Diana I. Brixner, RPh, PhD, Joanne LaFleur, PharmD, MSPH, Xiangyang Ye, MS, and Liz Joy, MD, MPH.

With this survey, we hope to determine how you and other healthcare professionals seek new drug information in community clinics in the University of Utah Health Care System. We also hope to find some ways that pharmaceutical companies can improve the way drug information is disseminated to these clinics. We know that many community clinics have policies that restrict access of sale representatives to clinicians, which may be eliminating a potentially important source of drug information.

Information obtained from this survey will be kept strictly anonymous. All collected information will be kept strictly confidential in a password protected file. Only the investigators would have access to it.

This survey should take only about 5-7 minutes to complete. The survey is available for 20 days to complete from the time that you received my email. The results will be compiled by the end of April.

I thank you in advance for participating and we will provide you a copy of the results. We will also be pleased to present the results to your clinic in return for your participation.

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1. Which of the following terms best describe your profession ? *

- Physician
- Physician Assistant
- Resident Physician
- Nurse Practitioner
- Pharmacist
- Other (please specify)

2. What is your age in years ? *

3. What is your sex ? *

- Male
- Female

4. How many years has it been since you completed your training, including either graduate school, residency or fellowship ? *

5. How many years have you been in your current practice ? *

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6. What is the location of your primary practice site ? (Please select the best one. If you have multiple sites, please complete this survey for only one site) *

- Redstone
- Redwood
- Greenwood
- Madsen
- Sugarhouse
- Centerville
- Stansbury
- Parkway
- South Jordan
- Westridge
- Other (please specify)

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Instructions to change answers for matrix questions

To change your answer for a particular choice selected, click the button that corresponds to the correct choice.

7. How often do you use the following sources of information listed below for making clinical decisions?

	At least Daily	Weekly	Monthly	once in 6 months	Yearly	Less than once a year
Library references such as books (harrison)	○	○	○	○	○	○
Journals	○	○	○	○	○	○
The University of Utah Drug Information Service	○	○	○	○	○	○
Pharmaceutical sales representatives	○	○	○	○	○	○
Medical Science Liaisons	○	○	○	○	○	○
Request from pharmaceutical manufacturers	○	○	○	○	○	○
Product Websites	○	○	○	○	○	○
Personal digital assistance (PDA)	○	○	○	○	○	○
Medical literature indices such as PubMed, MEDLINEPlus and CINAHL	○	○	○	○	○	○
Drug information database such as Micromedex, epocrates	○	○	○	○	○	○
Other electronic sources such as Google and Wikipedia	○	○	○	○	○	○
Other (specified below in question number 8)	○	○	○	○	○	○

8. If any other source is used to obtain **new drug information** please specify ?

Rate them on the frequency scale provided in the above question ? **(Question**

number 7)

- Other (Please specify) _____

9. How often do you consult other health care professionals to obtain **new drug information** for clinical decision making ?

	At least daily	Weekly	Monthly	Once in 6 months	Yearly	Less than once a year
Physician						
Physician assistant						
Resident physician						
Nurse practitioners						
Pharmacists						
Other health care professionals						

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10. In the past year, how often have you interacted with a pharmaceutical sales representative ?

- 5 or more times per week
- 3 - 4 times per week
- 2 - 3 times per week
- Once per week
- Twice per month
- Once per month
- Less than once per month
- Never

11. What is your view on the importance of pharmaceutical sales representatives in obtaining **new drug information** for clinical decisions?

Very important		Neutral		Not important
1	2	3	4	

					5
View on the importance of pharmaceutical sales representatives in obtaining new drug information for clinical decisions	○	○	○	○	○

12. Please indicate how would you rate the following aspects of **new drug information** provided by pharmaceutical sales representatives on a scale of 1 to 5 ? (1 = highest, 5 = lowest)

	Highest 1	2	Moderate 3	4	Lowest 5
Quality of information provided	○	○	○	○	○
Depth of information provided	○	○	○	○	○
Accuracy of information provided	○	○	○	○	○
Your acceptance on information provided	○	○	○	○	○

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13. Would you consider the **new drug information** provided by pharmaceutical companies to be more valuable if it was given by a professional from your field instead of a pharmaceutical sales representatives ?

○ Yes

○ No

14. Please explain why you answered question 13 (above) the way you did?

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15. Which of the following policies are allowed at the clinics with respect to sales representatives ?

Please select all that apply at your primary practice site that appropriately completes the sentence that begins with

Sales representatives are allowed .....

(Make between 1 and 9 selections)

- ☐ .... only if they have an appointment
- ☐ ....only for one on one presentations
- ☐ ....only for group presentations
- ☐ .... only if they bring meals
- ☐ .... only if they don't bring meals
- ☐ ...to gives gifts less than 100$
- ☐ .... to have open access to clinicians
- ☐ Sales representatives are not allowed any access to clinicians
- ☐ None of the above
- ☐ Other restrictions (Please specify)

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16. Please indicate your perception about the impact of these policies on clinical care on a scale of 1 to 5 ? (1= Helps clinical care, 3 = Neutral ,5 = Hinders clinical care)

	Helps in clinical care 1	2	Neutral 3	4	Hinders clinical care 5
Sales representatives are allowed only if they have an appointment	○	○	○	○	○

Sales representatives are allowed only for one on one presentations	○	○	○	○	○
Sales representatives are allowed only for group presentations	○	○	○	○	○
Sales representatives are allowed only if they do not bring meals	○	○	○	○	○
Sales representatives are allowed only if they bring meals	○	○	○	○	○
Sales representatives are allowed to have open access to clinicians	○	○	○	○	○
Sales representatives are not allowed any access to clinicians	○	○	○	○	○
Sales representatives are allowed to give gifts less than 100$	○	○	○	○	○
Other restrictions (specified **above** in **Question number 15**)	○	○	○	○	○

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17. Please provide any comments about the impact of these restrictions on clinical care

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18. What are some of the common barriers for obtaining **new drug information** in the

absence of sales representatives on a scale of 1 to 5? (1- Highly common barrier, 5- Not a barrier)

	Highly common barrier 1	2	3	4	Least common barrier 5
Not enough time	○	○	○	○	○
Insufficient computer technology skills	○	○	○	○	○
Limited literature evaluation skills	○	○	○	○	○
Inadequate access to information sources at work	○	○	○	○	○
Other (specified **below** in **Question number 19**)	○	○	○	○	○

19. If other barriers exists to clinicians for obtaining **new drug information** in the absence of sales representatives please specify ?

    Rate them on a scale of 1 to 5 provided in the above question ? (**question number 18)**

○ Other (please **specify** and **rate** them) [ ]

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20. In the absence of sale representatives, what other information sources can pharmaceutical companies use to provide **new drug information** on a scale of 1 to 5 ? (1-Most preferred source, 5-Lease preferred source)

	Most Preferred 1	2	Neutral 3	4	Least preferred 5
Email updates	○	○	○	○	○
Mailed fliers	○	○	○	○	○
Online webinars	○	○	○	○	○

Medical science liaisons providing new drug information	○	○	○	○	○
Conference calls from pharmaceutical companies	○	○	○	○	○
Free access to new drug dossiers that outline new drug information	○	○	○	○	○
The provision of internet links to web sites that provide new drug information	○	○	○	○	○
DVD	○	○	○	○	○
Continuing education	○	○	○	○	○
Other (specified **below** in **question** number **21**)	○	○	○	○	○

21. If other (please specify)

Rate them on a scale of 1 to 5 provided in the **above question** ,Question number **20**)

☐ Other (please **specify**)

22. What kind of **new drug information** would you like to get from pharmaceutical companies that would enable you to make better clinical decisions on a scale of 1 to 5 ? (1- most preferred kind of drug information, 5- least preferred kind of drug information)

	Most preferred 1	2	Neutral 3	4	Least preferred 5
General information about disease states and disease state management, including practice guidelines	○	○	○	○	○
Specific information about clinical trials related to a specific drug	○	○	○	○	○
Specific information about drug-drug interactions	○	○	○	○	○
Specific information on the mode of administration	○	○	○	○	○
Specific information about the dosage of the drug	○	○	○	○	○
Specific information about the	○	○	○	○	○

possible side effects of the new drug					
Specific information about drug safety	○	○	○	○	○
Specific information about drug efficacy	○	○	○	○	○
Other (specified **below** in **question 23**)	○	○	○	○	○

23. If other please specify ?

Rate them on a scale of 1 to 5 provided in the above question. (**Question number 22**)

○ Other (Please Specify) [ ]

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24. Please indicate your belief about the influence of drug detailing by pharmaceutical representatives on health care professionals ?

	Positive	Neutral	Negative
The influence is	○	○	○

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25. Have these restrictions had an influence on the way you access drug information ?

○ Yes

○ No

26. Please comment on the impact of "Restricted access of sales representatives to health care professional' has had on the way you seek new drug information either positive or negative?

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Save And Previous | Finish

This questionnaire is anonymous. Contact this questionnaire's administrator.
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Drug Information Sources Questionnaire Confirmation Page

You have reached the end. You can use the Previous button to go back and review or change your responses, or you can click the Submit Final button to submit your responses.

Once you click Submit Final, you will not be able to make subsequent changes to your responses.

Preview

Previous | Submit Final

This questionnaire is anonymous. Contact this questionnaire's administrator.
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Drug Information Sources Questionnaire Completion Page

Thank you for completing this questionnaire.

You can now close this window.

APPENDIX B

TABLES

Table B.1- Clinicians' Reported Frequencies of Use of the Different Sources to Seek New Drug Information

Resources	At Least Daily		Weekly		Monthly		Once in 6 Months		Yearly		Less than once a Year		Missing	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Library References	1	2	10	23	11	25	11	25	1	2	8	19	1	2
Journals	2	5	15	54	22	51	4	9	0		0		0	
U of U DI services	0		1	2	11	25	8	19	2	5	18	42	2	5
Pharmaceutical Sales Reps	0		0		1	2	8	19	3	7	29	68	5	12
Medical Science Liaisons	0		0		1	2	2	5	3	7	32	74	5	12
Request from Pharmaceutical Mfg	0		0		0		3	7	1	2	37	86	2	5
Product Websites	0		0		4	9	11	25	6	14	20	46	2	5
PDA	10	23	7	16	4	9	0		1	2	19	44	2	5
Medical Literature Indices	6	14	13	30	9	21	2	5	4	9	6	14	3	7
Drug Information Database	20	46	7	16	6	14	3	7	1	2	4	9	2	5

Table B.1 - Continued

Resources	At Least Daily		Weekly		Monthly		Once in 6 Months		Yearly		Less than once a Year		Missing	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Other Electronic Sources	8	19	13	30	10	23	6	14	1	2	4	9	1	2
Other	4	9	4	9	6	14	1	2	1	2	6	14	21	49

Table B.2- Pharmacists' Reported Frequencies of Use of the Different Sources to Seek New Drug Information

Resources	At Least Daily		Weekly		Monthly		Once in 6 Months		Yearly		Less than once a Year		Missing	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Library References	0	2	7	19	6	17	11	30	1	3	9	25	2	5
Journals	4	11	10	28	8	22	9	25	1	3	3	8	1	3
U of U DI services	3	8	3	8	9	25	16	44	1	3	4	11	0	
Pharmaceutical Sales Reps	0		1	3	3	8	7	19	3	8	21	58	1	3
Medical Science Liaisons	0		1	3	0		4	11	4	11	25	69	2	5
Request from Pharmaceutical Mfg	0		0		1	3	11	30	8	22	15	42	1	3
Product Websites	0		5	14	16	44	8	22	3	8	4	11	0	
PDA	4	11	6	17	2	4	1	3	1	3	21	58	2	5
Medical Literature Indices	7	19	7	19	13	36	5	14	1	3	2	5	1	3
Drug Information Database	28	78	4	11	4	11	0		0		0		0	
Other Electronic Sources	10	28	12	33	7	19	4	11	0		0		0	
Other	0		2	5	3	8	1	3	0		5	14	23	64

APPENDIX C

DEFINITIONS

1. Health care professionals- For this study health care professionals (HCP) are referred to as clinicians and pharmacists collectively.
2. Drug information databases (Micromedex, ePocrates) - It is defined as a database that includes information on thousands of prescriptions and over-the-counter medication, including information on dosing, potential side effects, interactions with food and/or other drugs, drug reviews, emergency treatment protocols and information on alternative and herbal medicines. Examples of these databases include Micromedex and Epocrates.
3. Medical literature indices- It refers to articles in books and journals dedicated to the field of medicine. They are online libraries containing massive collections of medical journals. Examples include PubMed, MEDLINE Plus and CINAHL. They provide easy access to extensive information about drugs, clinical trials, drug safety and the latest health news.
4. Electronic sources- For this study, they were defined as search engines used to find medical information. Examples: Google, Wikipedia.

5. General practitioners- They are physicians but in different countries they are known as general practitioners.(GP)

6. Utah Health Research Network (UHRN) - The Utah Heath Research Network is a network that helps in promoting research within the University of Utah between providers and researcher. It overlooks studies carried out within the community clinics and acts as an interface between the principal investigator and the health care professionals. This research network helps in coordinating meetings with providers to ensure participation. UHRN provides a platform to begin research involving providers and researcher. It begins with submitting the research proposal with its aims, objectives, study groups and implications. All the community clinics within the University of Utah are under the cover of the network with a centralized email system among the clinicians for effective communications.[34]

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